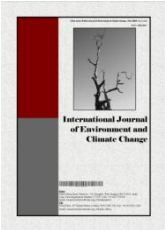

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Impacts of Climate Change: Evaluating the Awareness, Concern and Intent of Public Policy Support on Planning Adaptation of Bahamians

Feraldo D. Joffre[1*] and Berkley N. King Jr.[2]

[1]School of the Environment, Florida A & M University Tallahassee, FL, USA.
[2]School of Education, Norfolk State University Norfolk, VA, USA.

Authors' contributions

This work was carried out in collaboration between both authors. Author FDJ designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author BNKJ managed the editing of the manuscript. Both authors read and approved the final manuscript.

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ABSTRACT

The detrimental impacts of climate change on the Bahamas establishes the need for Bahamian citizens to be aware of the causes and effects that are related. This study conducts an assessment of the knowledge, concern and support of policy relative to climate change impacts of Grand Bahamians. The objectives were to assess the awareness and concern of Grand Bahamians; examine the difference in participants' awareness and concern of climate change impacts; analyze the factors that influence the awareness and concern of climate change impacts of participants; and assess the predictive ability of the Value Belief Norm Theory in relation to the participants' intent to support policy for climate change issues. A mixed-method approach was utilized where a survey questionnaire and Focus Group Interviews were conducted with members of the population. Findings of this study show that Grand Bahamians have a low level of scientific knowledge, a high level of concern regarding climate change and a strong intent to support policy for climate adaptation. Despite this low level of scientific knowledge, they have a developed experiential knowledge due to their frequent exposure to extreme climate events they perceive to be associated

**Corresponding author: E-mail: feraldo1.joffre@.famu.edu;*

with climate change. The high level of concern influences their desire to support policies aimed at adapting to the adverse impacts of climate change.

Keywords: Climate change; Grand Bahama; awareness; adaptation.

1. INTRODUCTION

Climate change impacts such as sea level rise, are projected to have detrimental impacts on small island states like The Bahamas, therefore leaving the country vulnerable to the adverse effects associated with the increase in atmospheric carbon dioxide (CO2) [1]. Climate change is the shift in global or regional climate patterns due to increased levels of atmospheric CO2 caused by the burning of fossil fuels (Lexico Dictionaries). Temperature plays a vital role in the influence of climate and elements associated with the different seasons. From the 19th century, the Earth's surface temperature has increased 1.8°F (1.0°C). This period experienced the warmest temperatures in modern day history; with seventeen of the eighteen hottest years on record (from 1880), occurring since 2001 [2]. The surface temperature of the Earth is expected to continually rise through the 21st century, even with different scenarios of anthropogenic Greenhouse gases (GHGs) projections (The Intergovernmental Panel on Climate Change [3]. Anthropogenic activities like deforestation and the burning of fossil fuels for travel and power usage, help to exacerbate the emission and atmospheric absorption of carbon dioxide and other GHGs [4]. The escalation in temperature because of the gases, are projected to increase the frequency and intensity of extreme summer temperature, because of mean warming and changes in temperature variability [5]. The most notable of the GHGs and widely considered contributor to climate change, is CO2 [6]. The industrial era has largely contributed to increases in GHGs and marked concentrations of the primary gases (water vapor, CO2, nitrous oxide, methane and ozone) have been detected within the atmosphere, which has been widely considered as the principal source of monitored warming since the mid-twentieth century (The Intergovernmental Panel on Climate Change [3].

1.1 Sea Level Rise

A common misconception or "untruth" regarding sea level rise is the driving force of this event. An overwhelming majority of the public believe that the melting of the ice caps at the poles is the main cause of sea level rise [7]. However, the mentioned process contributes a negligible amount to sea level rise. The most considerable amount of sea level rise occurs because of the melting of ice sheets on land, which consequently, flow into the sea, as well as thermal expansion of water in the ocean [8]. Sea level rise will be most visible during flooding events and high tide, where the distances of flood zones will be increased, and the threshold of local flooding will be exceeded without difficulty [9]. Therefore, sea level rise will be a substantial threat to coastal and low-lying communities, as they are most vulnerable to the associated adverse effects [10]. Additionally, there are numerous studies with data suggesting that projections for the Caribbean relative to sea level rise, may be even more noticeable than that of other regions because of its location to the equator [11]. The warmest areas of the planet are found in the tropics near the Equator and will experience additional warming because of climate change [12]. Even if precautionary measures are enacted to mitigate the causes of sea level rise, it will not be unreasonable if the estimates for the Caribbean region illustrate a rise of 1m and 2m by the end of the century [13].

1.2 Climate Change Awareness

A person who is aware of climate change is one who can exhibit an understanding of the causes and impacts of climate change. Hopefully, a person who demonstrates an advanced understanding of climate change, is also more inclined to exhibit a higher capacity to adaptation [14]. Awareness is obtained from different sources, where the media plays an important role in disseminating information regarding a variety of subject matters to the public. This information is received or viewed by the public through many forms, ranging from local and national news to film and other formats of visual media. Communicating important climate change material plays a critical role in raising awareness and inciting a response for behavioral change [15]. It is a well-known fact of the difficulty incurred with transferring scientific data collected from research to the public. To help with this issue of translation, communication experts can enlighten scientists and policy makers on innovative and motivating ways to engage audiences [15]. In a recent study [16] conducted

in The Bahamas related to climate change awareness, respondents said that the principal source of the information they obtained was from the media; primarily the news or film.

During this study, an assessment of the knowledge, concern, sense of responsibility and support of policy in relation to climate change impacts of Grand Bahamians was conducted. This study identifies the participants' level of awareness, concern and sense of responsibility regarding the subject and their approach/views to adaptation of the adverse effects related to climate change. The population for this study was comprised of residents over the age of 18 on the island of Grand Bahama. The topography and geographical location of The Bahamas makes it susceptible to many environmental and/or weather-related conditions that could lead to the destruction of the islands. Some of the most increasing and adverse impacts of climate change on The Bahamas are erosion, flooding and salt water inundation due to the rise of sea water, which can affect all the islands with the possibility of complete water submergence to some of the smaller extremely low-lying islands and cays (The Intergovernmental Panel on Climate Change [3]. The IPCC Climate Change 2014 Synthesis Report indicates that it is very likely that 95% of the sea level in the ocean will rise by the end of the 21st century.

1.3 Value Belief Norm Theory

The application of [17] Value Belief Norm Theory (VBN) to this study was used to guide the research and evaluate the predictive ability of the theory. The VBN is a causal chain that proclaims the ability to predict the pathway of pro-environmental behavior (PEB). Because actual behavior was not tested in this study, the references to environmental behavior should be understood as representing ''behavioral intentions''; specifically, intentions to support governmental policies for climate change adaption. The PEB that was analyzed in this research, is the intent of the participants support for adaptation policy on climate change issues. There are several variables that are associated with the VBN; however, this study will only examine: (1) New Environmental (Ecological worldview) Paradigm (NEP), (2) Awareness of Consequences (AC), and (3) Ascription of Responsibility (AR) (Fig. 1). The NEP reveals a person's view on humanity's ability to interrupt the natural progression of the environment; AC speaks to the consciousness of the negative impacts of an individual's actions associated with the things they value, as it relates to additional people and other things; and AR speaks to the sense of concern that negative impacts of an individual's actions have or feelings of contribution to the problem [18]. The theory makes claim that the associated variables are connected in a chain like assembly, where each one has a direct effect on the other. The variables assessed in this study are associated with the beliefs of an individual, that helps to form a decision to indulge or abstain from actions beneficial to the environment.

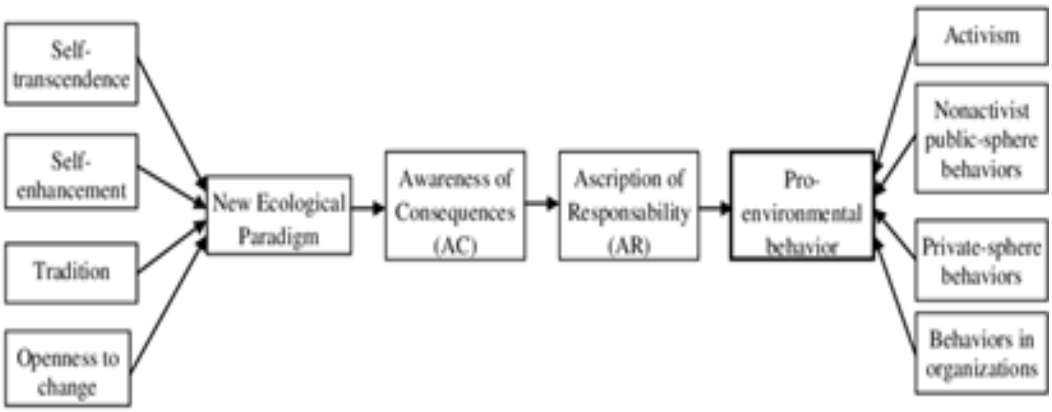

Fig. 1. Value Belief Norm Theory Model (Stern et al., 1999)

2. ANALYTIC METHODS/DATA ANALYSIS

The study was conducted using a sequential explanatory method, where both qualitative and quantitative data was collected to give a better understanding and depth of the results [19]. Since a similar study was already completed in Lee County, Florida, the same methods were employed during this study. The instrument and methodology utilized in this study were reviewed and approved by the Florida Agricultural & Mechanical University Institutional Review Board for human subjects, prior to conducting the study. The population for this study was comprised of residents over the age of 18 on the island of Grand Bahama, where they were randomly selected for participation in a paper-pencil survey of nine questions utilizing the Likert Scale and three multiple choice questions. After the completed paper-pencil surveys were collected, a portion of the respondents were then asked to contribute to a Focus Group Interview (FGI). Participants in the focus group were asked to respond to eight open-ended questions, which were used to supplement the paper-pencil survey to disclose a deeper understanding of the quantitative data.

2.1 Instrumentation

A mixture of instruments was revised to meet the specific requirements of this study. The Revised New Environmental Paradigm (NEP) Scale [20] was employed to measure the concept of environmental concern (EC). Dunlap's Revised NEP scale consists of fifteen (15) questions; however, to encourage participation in the study, three (3) questions were selected to shorten the length and decrease the time in completing the survey. Another instrument that was utilized in this study was adapted from Factors influencing the acceptability of energy policies [21]. The survey was used to measure the concepts awareness of consequences (AC) and ascription of responsibility (AR). The original survey addressed matters associated with energy consumption and was therefore revised to apply to climate change impacts. The questions that pertain to Policy Support were derived from the Lee County Climate Change Resiliency Strategy (CCRS) [22], but were tailored specifically for Grand Bahama.

2.2 Quantitative Methods

In this study the methods used were similar to that conducted by [23], where the following concepts were measured: (1) Environmental Concern (EC), (2) Awareness of Consequences (AC), (3) Ascription of Responsibility (AR), and (4) willingness to support climate change policies and adaptation strategies. To practically and quantitatively measure the mentioned concepts, they were deployed into individual variables. The concept of environmental concern was identified through the overall score on the questions related to the NEP. The concept of awareness of consequences was identified through the overall score on the questions related to impacts of climate change knowledge. The concept of ascription of responsibility was identified through the overall score on the questions related to the sense of responsibility. The principal concept that was assessed during this study is the readiness for public support of climate change policy and adaptation strategies, which was identified through the overall score on the questions related to support of climate adaptation. Each response of the NEP, AR and policy support questions was given a score that ranged from 1 to 5, based on their selection of answers from "strongly disagree" to "strongly agree;" where strongly disagree was denoted as one (1) and strongly agree denoted as five (5) (Table 1; See Appendix 1). The accumulated score from each question was then summed, where a total score ranging from eleven (11) to fifteen (15) was designated as a person with high level, a score ranging from six (6) to ten (10) was designated as a person with moderate level, and a score below six (6) was designated as a person with low level (Table 2).

Table 2. Levels of ecological concerns, ascription responsibility/support for policy

Level	Total Score Range
High	11-15
Moderate	6-10
Low	Below 6

Responses related to AC took on a different format from that of the previous questions, as these were based on factual knowledge rather than agreement or disagreement with a statement. Responses to questions ten (10) to twelve (12) were scored one (1) for the correct answer and zero (0) for the incorrect answer (Table 3).

The accumulated score from each question was then summed, where a total score of three (3) was designated as a person with a high awareness of consequences, a score of two (2)

was designated as a person with a moderate awareness of consequences, and a score below two (2) was designated as a person with a low awareness of consequences (Table 4).

2.3 Qualitative Methods

The use of qualitative research in this study, highlighted the participants' concern, awareness, feelings of responsibility and support of climate change impacts, by illustrating their diverse and detailed point of views. As a result, this helped to acutely identify their perception and understanding of the impacts of climate change. Participants in the focus group were composed of a voluntary small cluster solicited from respondents of the paper-pencil survey.

The main objective of this area of the study was to collect a more in-depth response to the questions of the paper-pencil survey and inquire on various aspects and associations with each variable examined. Specific questions for the focus group were asked to the participants during these sessions, to acquire the depth of knowledge in their individual terminology on the study topics. Verbal responses during the sessions were recorded and transcribed, and the data collected was verified to ensure accuracy. During the assessment of the data collected, the results were coded and categorized according to the focus group questions. The sequential mixed method approach applied in this study for the research questions, allows a concurrent triangulation analysis of the data to be conducted [24].

3. RESULTS AND DISCUSSION

The descriptive data collected in this study for demographics were gender, age range, highest level of education, profession and environmental interaction. The statistical analyses of the gender demographic show that there was a total number of 613 (N = 613) participants in this study, with 300 being males (48.9%) and 313 being females (51.1%). The respective mean for the demographics age range, education level and environmental interaction of the participants was those between the age of 33 – 48, those who only attained some college for their education and those who reported interacting with the environment on a weekly basis. The profession demographic showed that more than half of the respondents were employed in the private sector (58.7%), 29.7 % reported being employed in the public sector, while 10% reported being self-employed. The age group with the most participants in this study also represented the median age of The Bahamas, which is 33. The results showed that 42.6% of respondents were in the age range of 33 – 48.

3.1 Awareness of Consequences

Question 10 was written to examine how aware the participants were with climate change terminology, where results showed that more than half (55.5%) of the participants chose the correct answer (Table 5).

Table 3. Awareness of consequences score

	Correct Answer	Incorrect Answer
The "greenhouse" refers to?	1	0
Sea level rise is caused by?	1	0
If global warming is occurring, which greenhouse gas do you think has contributed the most to Earth's warming?	1	0

Table 4. Level of awareness of consequences

Level of Awareness of Consequences	Total score
High	3
Moderate	2
Low	1 or 0

Table 5. Q10: The "greenhouse effect" refers to?

Answer: Gases in the atmosphere that traps heat		Frequency	Percent
Valid	Incorrect	273	44.5
Correct		340	55.5

Table 6. Q11: Sea level is caused by?

Answer: Warming of the ocean and melting of the ice sheets	Frequency	Percent
Valid Incorrect	386	**63**
Correct	227	37

Table 7. Q12: Greenhouse gases absorb and hold heat from the sun that warms up the earth's surface. If global warming is occurring, which greenhouse gas do you think has contributed the most to Earth's warming?

Answer: Carbon Dioxide [CO2]		Frequency	Percent
Valid	Incorrect	305	**63**
Correct		308	50.2

Questions 11 and 12 were written to test the participants understanding of the contributing factors of climate change. From their response, the participants had the least understanding of the current sources of climate change. For question 11, the majority (63%) of participants chose the incorrect answer (Table 6). While in question 12, the majority (50.2%) of the participants chose the correct answer, despite the closeness in results (Table 7).

The residents of Grand Bahama demonstrated a limited understanding of basic climate science. On average, the participants selected the scientifically validated answer 48% of the time across the span of the three questions.

3.1.1 Environmental concern

The participants' response to questions 1 through 3 was used to determine their level of environmental concern. Overall, the participants' responses selected some form of agreement 62% across the span of the three questions, 16% were neutral and 22% selected some form of disagreement. In question 1, almost half (47.5%) of the respondents indicated some degree of disagreement with the statement "The earth is like a spaceship, with very limited room and natural materials," while 17% were neutral and 35.5% indicated some degree of agreement. In Question 2, more than three-quarters (78.8%) of the respondents indicated some degree of agreement to the statement "If things continue on their present path, we will experience a major global disaster." Concurrently, 13.4% of the participants were neutral, while 8.3% indicated some degree of disagreement with the statement. In questions 3, where the statement "The balance of nature is very fragile and easily upset." There were 72.9% of participants that agreed, 16.6% that were neutral and 10.5% that disagreed.

3.1.2 Ascription of responsibility

An analysis of questions 4 through 6 examined the participants' belief of their personal contribution to the cause of climate change and showed that 61% of those polled felt that they personally contributed to climate change, while 18% were neutral and 21% did not feel like they personally contributed to climate change.

3.1.3 Support for policy

The participants' response to questions 7 through 9 was used to determine their support for climate change policy. An overall analysis overwhelmingly demonstrated that the participants would support policy directed at climate change, where well over two-thirds (87.6%) agreed to some degree, 8.2% were neutral and 4.2% disagreed to some degree.

3.2 Research Questions

Q1: What is the level of awareness and concern of Grand Bahamians on information related to the impacts of climate change?

Results of the analysis showed that participants in the survey have a low level of awareness

(mean = 1.43, SD = .943) and a high level of concern (mean = 10.78, SD = 2.61) on information related to the impacts of climate change (Tables 8, 9 & 10).

Q2: How does knowledge and concern associated with climate change impacts differ among participants, as measured by the survey analysis?

Several analyses were performed and showed that several differences were noted. A one-way ANOVA conducted between AC and demographic factors revealed that the factors education level (η^2 = .08) and profession (η^2 = .03) achieved medium and small statistical differences, respectively. A means comparative test conducted for gender showed that males had higher scores than females. There is also a negative correlation between AC and age, as well as a positive correlation between AC and environmental interaction. Respondents who reported working for themselves scored the lowest on questions related to AC. A one-way ANOVA conducted between NEP and demographic factors revealed that the factors education level and environmental interaction achieved small statistical differences. A means comparative test conducted for gender showed that females had higher scores than males. There is also a pattern indicating a positive correlation between NEP and age, as well as a positive correlation between AC and education level. Respondents who reported working in the private sector scored the lowest on questions related to NEP (Table 11).

Table 8. Mean of TAC and TEC

	TAC	TEC
Mean	1.43	10.78
SD	.943	2.61

Table 9. Levels of awareness of climate change impacts

Levels	Frequency	Percent
Low	313	51
Moderate	220	36
High	80	13

Table 10. Levels of environmental concern

Levels	Frequency	Percent
Low	37	6
Moderate	238	39
High	338	55

Table 11. Differences in AC and NEP

	Statistical Analysis	Predictive Factors	Results
AC	ANOVA	Education Level	η^2 = .08
	ANOVA	Profession	η^2 = .03
	Comparative mean	Gender	males = 1.44; females = 1.41
	Comparative mean	Profession	Self Employed with lowest
	Pearson's Correlation	Age	- Correlation
	Pearson's Correlation	Environmental Interaction	+ Correlation
NEP	ANOVA	Education Level	η^2 = .03
	ANOVA	Environmental Interaction	η^2 = .02
	Comparative mean	Gender	males = 10.74; females =
	Comparative mean	Profession	10.81
	Pearson's Correlation	Age	Private Sector with lowest
		Education Level	+ Correlation
			+ Correlation

Q3: Which of these factors (age range, education level and environmental interaction) are statistically significant predictors of awareness and concern about climate change information among participants?

A standard multiple regression was performed between AC as the dependent variable and age range, education level and environmental interaction as independent variables. Table 12 displays the correlations between the variables, the unstandardized regression coefficients (B) and intercept, the standardized regression coefficients (β), R^2 and adjusted R^2. R for regression was significantly different from zero $F(5, 607) = 8$, $p < .001$, with R^2 at .062. The results of the analyses showed that education level made the largest unique contribution to AC.

A standard multiple regression was performed between NEP as the dependent variable and age range, education level and environmental interaction as independent variables. Table 13 displays the correlations between the variables, the unstandardized regression coefficients (B) and intercept, the standardized regression coefficients (β), R^2 and adjusted R^2. R for regression was significantly different from zero $F(5, 607) = 3.26$, $p < .007$, with R^2 at .026. The results of the analyses showed that education level made the largest unique contribution to NEP.

Q4: Does the Value Belief Norm (VBN) Theory have the ability to predict pro-environmental behavior, as measured by the survey analysis?

A standard multiple regression was performed to examine the ability of the VBN theory to influence the support for climate change adaptation policy. The standard multiple regression was conducted between TSP as the dependent variable and TAC, TAR and TNEP as predictor variables. Table 14 displays the correlations between the variables, the unstandardized regression coefficients (B) and intercept, the standardized regression coefficients (β), R^2 and adjusted R^2. R for regression was significantly different from zero $F(3, 609) = 28.83$, $p < .000$, with R^2 at .124. The results of the analyses showed that NEP and AR contributed to SP, with NEP having the largest unique influence.

Table 12. Standard multiple regression between AC and demographic variables

	AC	1	2	3	4	5	B	SE (B)	B
Age	-.048						-.060	.047	-.050
Education Level	.239	.002					.165*	.027	.248
Env. Interaction	.026	.097	1.06	-.215	.027		.006	.032	-.007
Means	1.43	1.98	4.41	1.51	1.84	3.14			
SD	.943	.790	1.418	.500	.679	1.188			

*$R^2 = .062$, Adjusted $R^2 = .054$, $R = .249$ [a], Intercept = .934, ** p < .0*

Table 13. Standard multiple regression between AC and demographic variables

	NEP	1	2	3	4	5	B	SE (B)	B
Age	-.021						-.056	.133	.050
Education Level	.151	.002					.272*	.076	.248
Environmental Interaction	.066	.097	1.06	-.215	.027		.110	.091	.005
Means	10.78	1.98	4.41	1.51	1.84	3.14			
SD	2.61	.790	1.418	.500	.679	1.188			

*$R^2 = .026$, Adjusted $R^2 = .018$, $R = .162$[a], Intercept = 8.92, ** p < .01*

Table 14. Standard multiple regression between TSP and measures of belief variables

	TSP	1	2	3	4	5	B	SE (B)	B
TNEP	.3						.174*	.034	.212
TAR	.3	.4					.164*	.033	.210
TAC	.084	.17	.21	-.215	.027		.007	.088	.003
MEANS	13.49	10.78	10.71	1.51	1.84	1.43			
SD	2.14	2.61	2.74	.500	.679	.943			

*$R^2 = .124$, Adjusted $R^2 = .120$, $R = .353$[a], Intercept = 9.86, ** p < .01*

3.3 Qualitative Analysis

The questions in the focus group survey instrument were divided into four areas that aimed at assessing the belief orientation (AC, NEP, AR) and PEB of the participants. A triangulation of their response to the results from the quantitative section was conducted. This triangulation identified information from both methods that overlapped, with complimentary and contrary viewpoints of the participants.

3.3.1 Awareness (AC)

Upon analyzing the response of the participants to the questions in the area assessing awareness, it could be determined that majority of the participants had a limited understanding of science-based climate change. However, they have developed experiential knowledge of the associated impacts. In the quantitative section, the overall mean score of the participants was 1.43, which fell below 2, signifying a low level of understanding. Even though some of the participants acknowledged having a limited understanding, their responses to the questions were indicative of a moderate level of understanding, which was not aligned with the quantitative section. The focus group setting played a vital role in steering the participants in collectively engaging in meaningful discussions that were rational and comprehensive, while giving insight outside the content themes [25]. In the quantitative section, a gender difference showed that males had a slightly higher mean score, where in the qualitative section the response of the males indicated that they had a better understanding of climate change. The different focus group participants were united in their responses to the questions that assessed awareness. A small amount of the participants opted not to respond to this question for unknown reasons.

3.3.2 Concern (NEP)

Through their responses to the questions related to EC, a greater portion of the participants indicated that they were concerned about climate change and its projected impacts to The Bahamas because of degradation. The response to these questions also followed suit with the quantitative section of the study, where 62% of the participants had some level of concern regarding adverse impacts to natural resources of the earth. Furthermore, females had a higher mean score (10.81) than males (10.74), which was consistent with the qualitative section of the study. This was observed through coding "degree of concern" for the participants, where some of the male's responses included "somewhat concerned," or simply "concerned," in comparison to the females who mostly responded with "very concerned." Although there were some varying degrees of concern, the different focus group participants were also united in their responses to the questions that assessed their ecological worldview.

3.3.3 Personal Contribution (AR)

The questions in this area assessed, showed that majority of the participants felt that they personally contributed to climate change because of their desire for convenience, despite feelings of insignificance to overall effects. The response to the questions in the qualitative section further confirmed the results found in the quantitative analysis, where 61% of the participants had some level of agreement that they personally contributed to climate change. The different focus groups were mostly united in their responses to questions that assessed feelings of responsibility. This area of assessment elicited one dissenting voice, because they felt that their impact was insignificant.

3.3.4 Policy Support (SP)

The qualitative analysis in this area of assessment showed that there was a consensus of support for policies of climate change adaptation strategies, even though there was a variety of factors that would determine their support. These responses were in alignment with the quantitative results, where more than two-thirds of the participants showed intent to support climate adaptation policy. While the different focus groups were united in their responses that showed their intent to support policy, they were divided in their responses to the question where they had to choose between economy and the environment. Those participants who chose the economy, discussed that their support was contingent upon responsible development, which would allow the ability for the reduction of any potential adverse impacts to the environment.

4. CONCLUSION

Overall, the respondents demonstrated a lack of understanding about climate change information. Many of the participants selected the wrong

answer for the total number of questions related to AC, despite two of the three questions (Q10 & Q12) having a higher percentage of correct answers. Consequently, it appeared that participants should have more than a basic understanding. However, as the methodology of the study prescribed, scores were given to each question, where the summed result of the three questions represented their level of awareness. Which in this area of assessment, more than half (51%) of the participants had a total score of either 1 or 0 (low level). Although more than half of the participants disagreed with the statement that measured their ecological worldview, in contrast, more than three-quarters of the participants agreed with statements that measured their belief in the volume of available natural resources, as well as the current and future state of the environment. Overall, majority of the participants had a high level of ecological concern. The combination of a basic understanding and a developed concern for climate change impacts, could be explicated by the frequent exposure to flooding and water surges associated with storm activities (Perez & Egan, 2016). Linden (2015) reported the positive correlation between the experience of extreme weather events and environmental risk perception; this experience can also influence attitudes and pro-environmental concerns [26].

Education attainment was the most powerful predictor across all four of the variables assessed in the present study. Analyses demonstrated that education level made the largest unique contribution and was the only independent variable that was significantly and positively correlated with all the dependent variables. The results from this study supported the overwhelming findings in previous studies across the globe that education was one of the main determinants of climate change awareness and concern [27,28].

The findings of this study confirm the results of other studies, regarding the legitimacy of the VBN and its ability to postulate climate change engagement. In this study, the VBN validated the participants' intent to support policy for climate change issues, as each variable along the pathway were positively correlated with their successor. When predicting behavioral intentions regarding any situation, the risk perception of those exposed, plays a very important role [29]. The results presented in this study supported previous research on self-reported experiences [30], which indicated that exposure to extreme weather events, can influence views concerning intentions to mitigate the effects of climate change.

4.1 Study Implications

The implications of the results of this study were very significant to the initiation and development of the climate change movement in Grand Bahama, and most importantly The Bahamas. Despite the forecast about the detrimental impacts of climate change to The Bahamas, there is a limited amount of research previously completed on the subject matter. It is therefore essential for more local environmental policy climate-based studies to be completed. The benefit of localized studies is climate change communication that is specific and culturally relevant to the population. Local communication also has personal significance that improves the dispensation, influence and comprehension of the message [31]. Even though the results of this study showed that Grand Bahamians had a low level of awareness regarding climate change, because of their experiential knowledge with some of the associated impacts (i.e. increased intensity and frequency of hurricanes, flooding, etc.), their concern was considerably augmented.

4.2 Future Research Suggestion

A considerable number of residents on Grand Bahama declined to participate in the survey, from what appeared to be a sense of intimidation. A great amount of time and effort was expelled in trying to persuade some of the residents to complete the paper-pencil survey, and even more for the focus group interview, possibly be due to the lack of exposure to research procedures and the sensitive nature of the bureaucratic and civic state of the island. Future research efforts should:

- Find innovative ways to encourage the participation of unemployed people, to ensure a richer diversity of respondents.
- Expand the research to permit the collection of data across other islands of the Bahamas, with the purpose of conducting a comparative analysis to identify variances in culture (attitude, beliefs, perception and behavior) among different island populations.
- Develop a methodology to measure climate awareness based on political affiliation in the Bahamas.

- Conduct a pilot study so that a survey method can be tailored specifically to the Bahamian population.
- Ensure that the research design allows:
  - The analysis of policy support to include a clear delineation of choices such as paying higher taxes, reductions to the standard of life, or changes in behavior, etc., as a measure to gauge the willingness of the participants support for climate change adaptation strategies.
  - The measurement of experiential knowledge of the adverse impacts of hurricanes and other climate related events.

CONSENT

The authors declare that 'written informed consent was obtained from all subjects or participants in the study.

ETHICAL APPROVAL

The authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the Institutional Research Board (IRB).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Julca A, Paddison O. Vulnerabilities and Migration in Small Island Developing States in the Context of Climate Change. Natural Hazards, 2009;55(3): 717-728. DOI:10.1007/s11069-009-9384-1
2. USGCRP: Climate Science Special Report: Fourth National Climate Assessment, Volume I [Wuebbles DJ, Fahey DW, Hibbard KA, Dokken DJ, Stewart BC, Maycock TK (eds.)]. U.S. Global Change Research Program, Washington, DC, USA. 2017;470. DOI: 10.7930/J0J964J6
3. IPCC. Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and Meyer LA (Eds.)]. IPCC, Geneva, Switzerland. 2014;151.
4. Pepper IL, Gerba CP, Brusseau ML. Environmental & Pollution Science. Amsterdam: Elsevier; 2006.
5. Fischer EM, Schär C. Future Changes in Daily Summer Temperature Variability: Driving Processes and Role for Temperature Extremes. Climate Dynamics. 2008;33(7-8):917-935. DOI:10.1007/s00382-008-0473-8
6. Cramer W, Bondeau A, Woodward FI, Prentice IC, Betts RA, Brovkin V, et al. Global response of terrestrial ecosystem structure and function to CO2and climate change: Results from six dynamic global vegetation models. Global Change Biology. 2001;7(4):357-373. DOI:10.1046/j.1365-2486.2001.00383.x
7. Englander J, Cousteau J. High Tide on Main Street: Rising Sea Level and the Coming Coastal Cri-sis. Boca Raton, FL: The Science Bookshelf; 2012.
8. Melet A, Meyssignac B, Almar R, Cozannet GL. Under-Estimated Wave Contribution to Coastal Sea-Level Rise. Nature Climate Change. 2018;8(3):234-239. DOI:10.1038/s41558-018-0088-y
9. Dahl KA, Fitzpatrick MF, Spanger-Siegfried E. Sea Level Rise Drives Increased Tidal Flooding Frequency at Tide Gauges Along the U.S. East and Gulf Coasts: Projections for 2030 And 2045. Plos One. 2017;12(2). DOI: 10.1371/journal.pone.0170949
10. Djouder F, Boutiba M. Vulnerability Assessment of Coastal Areas to Sea Level Rise from The Physical and Socioeconomic Parameters: Case of The Gulf Coast of Bejaia, Algeria. Arabian Journal of Geosciences. 2017;10(14). DOI:10.1007/s12517-017-3062-5
11. Bamber JL, Riva RE, Vermeersen BL, Lebrocq AM. Reassessment of The Potential Sea-Level Rise from A Collapse of The West Antarctic Ice Sheet. Science. 2009;324(5929):901-903. DOI:10.1126/science.1169335
12. Hsiang SM, Sobel AH. Potentially Extreme Population Displacement and Concentration in the Tropics Under Non-Extreme Warming. Scientific Reports. 2016;6(1). DOI:10.1038/srep25697
13. Simpson MC, Scott, DM. New et al. An Overview of Modelling Climate Change

Impacts in the Caribbean Region with Contribution from The Pacific Islands. Barbados, West Indies: United Nations Development Programme (UNDP); 2009.
14. Marshall N, Park S, Howden S, Dowd A, Jakku E. Climate Change Awareness is Associated With Enhanced Adaptive Capacity. Agricultural Systems. 2013;117:30-34.
DOI: 10.1016/j.agsy.2013.01.003
15. Depoux A, Hémono M, Puig-Malet S, Pédron R, & Flahault A. Communicating Climate Change and Health in The Media. Public Health Reviews. 2017;38(1).
DOI:10.1186/s40985-016-0044-1
16. Neely R, Owens MA. Bahamians and Climate Change: An Analysis of Perception of Risk and Climate Change Literacy. American Geophysical Union; 2011.
17. Stern PC, Dietz T, Abel TD, Guagnano G, and Kalof L. A Value-Belief-Norm Theory of Support for Social Movements: The Case of Environmentalism. Huxley College on the Peninsulas Publications. 1999;1.
18. Chen M. An Examination of The Value-Belief-Norm Theory Model In Predicting Pro-Environmental Behaviour In Taiwan. Asian Journal of Social Psychology. 2014;18(2):145-151.
DOI:10.1111/ajsp.12096
19. Molina-Azorin JF. Mixed methods research in strategic management. Organizational Research Methods. 2010;15(1):33-56.
DOI:10.1177/1094428110393023
20. Dunlap RE, Liere KD, Mertig AG, Jones, RE. New Trends in Measuring Environmental Attitudes: Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale. Journal of Social Issues. 2000;56(3):425-442.
DOI:10.1111/0022-4537.00176
21. Steg L, Dreijerink L, Abrahamse W. Factors Influencing the Acceptability of Energy Policies: A Test of VBN Theory. Journal of Environmental Psychology. 2005;25(4):415-425.
DOI: 10.1016/j.jenvp.2005.08.003
22. Beever III JW, Gray W, Utley J, Hutchinson D, Walker T, Cobb D. Lee County Climate Change Resiliency Strategy. Southwest Florida Regional Planning Council; 2010.
23. Olson A. Evaluating Public Support for Local Climate Adaptation Policies and Planning: A Case Concerning Lee County, Florida; 2014.
24. Terrell S. Mixed-Methods Research Methodologies. The Qualitative Report. 2011;17(1):254-280.
Available:http://www.nova.edu/ssss/QR/QR17-1/terrell.pdf
25. Seal DW, Bogart LM, Ehrhardt AA. Small Group Dynamics: The Utility of Focus Group Discussions as a Research Method. Group Dynamics: Theory, Research, and Practice. 1998;2(4):253-266.
DOI:10.1037//1089-2699.2.4.253
26. Lang C, Ryder JD. The Effect of Tropical Cyclones on Climate Change Engagement. Climatic Change. 2016; 135(3-4):625-638.
DOI:10.1007/s10584-015-1590-0
27. Lee TM, Markowitz EM, Howe PD, Ko C, Leiserowitz AA. Predictors of Public Climate Change Awareness and Risk Perception Around the World. Nature Climate Change. 2015;5(11):1014-1020.
DOI:10.1038/nclimate2728
28. Crona B, Wutich A, Brewis A, Gartin M. Perceptions of Climate Change: Linking Local And Global Perceptions Through A Cultural Knowledge Approach. Climatic Change. 2013;119:519–531.
29. O'Connor R, Bard R, Fisher A. Risk Perceptions, General Environmental Beliefs, and Willingness to Address Climate Change. Risk Analysis. 1999;19:461–471.
30. Reser JP, Bradley GL, Ellul MC. Encountering Climate Change: 'Seeing' Is More Than 'Believing'. Wiley Interdisciplinary Reviews. Climate Change. 2014;5(4):521-537.
DOI:10.1002/wcc.286
31. Maio GR, Haddock G. Attitude Change. In Kruglanski AW, Higgins ET (Eds.), Social psychology: Handbook of basic principles (2nd ed). New York, NY: Guilford. 2007; 565-586.

APPENDIX 1

Table 1. Standard multiple regression between TSP and measures of belief variables

Ecological concern (NEP) score	Strongly Agree	Mildly Agree	Neutral	Mildly Disagree	Strongly Disagree
The earth is like a spaceship with very limited room and natural materials.	5	4	3	2	1
If things continue on their present path, we will experience a major global disaster	5	4	3	2	1
The balance of nature is very delicate and easily upset	5	4	3	2	1
Ascription of responsibility (AR)score					
I have personally contributed to global warming.	5	4	3	2	1
I can personally help to lessen the impacts of global warming for Grand Bahama.	5	4	3	2	1
Not only the government and industry are responsible for high energy consumption levels, but me too.	5	4	3	2	1
Policy support score					
Do you agree that Grand Bahama should create a special district for areas that are vulnerable to sea level rise? The district would be shown on the island's land use map and would receive funding for projects aimed at helping the island adapt to sea level rise and coastal flooding	5	4	3	2	1
Do you agree that The Bahamas should act to reduce the effects of rising sea level, storm surge and flooding?	5	4	3	2	1
Should the Bahamas government require that all new construction located in areas vulnerable to sea level rise and storm surge to be built to withstand sea level rise?	5	4	3	2	1

Peer-review history:
The peer review history for this paper can be accessed here: